

Cascade County Weed & Mosquito Division

Pesticide Discharge Management Plan

The Cascade County Weed & Mosquito Division Pesticide Discharge Management Plan (PDMP) has been written to comply with the requirements imposed by the Sixth Circuit Court January 9, 2009 decision to vacate EPA's 2006 NPDES Pesticides Rule in *National Cotton Council of America v. EPA*, 553 F.3d 927 (6th Cir., 2009). Therefore, pesticide applications need to be permitted under discharge elimination system programs in all state and federal permitting programs. The Montana Department of Environmental Quality has issued a permit for pesticide 'discharge'. This permit imposes certain reporting requirements which include the formulation of a pesticide discharge management plan that, upon request, must be made available to the public under the Freedom of Information Act.

Cascade County's PDMP will conform to Integrated Pest Management (IPM) practices in the use of inspection, surveillance, chemical application, evaluation, recordkeeping/documentation, and equipment maintenance policies implemented by Cascade County Weed & Mosquito Division.

This PDMP will focus on pesticides and herbicides used for the control of mosquito larvae and pupae, adult mosquito control near or over water, and aquatic weed control. The county's existing Weed Management Plan (WMP), for terrestrial weed control, will not be part of this PDMP. The county's WMP document is available on request.

Contents of the PDMP include:

- 1. Pesticide Discharge Management Team**
- 2. Pest Management Area Description and Habitats**
 - a. Description of Target Mosquito Species**
 - b. Description of Target Aquatic Weed Species**
 - c. General Location Maps**
- 3. Control Measure Descriptions**
 - a. Mosquito Control**
 - i. Nuisance mosquitoes**
 - ii. Vector mosquitoes**
 - b. Aquatic Weed Control**
- 4. Control Schedules and Procedures**
- 5. Spill Response and Adverse Incident Response Procedures**
- 6. Plan Updates**

1. Pesticide Discharge Management Team

- a. **Person(s) responsible for developing, managing, and revising the PDMP**
Joshua Blystone, Superintendent
- b. **Person(s) responsible for developing, revising, and implementing corrective actions and other effluent limitation requirements**
Joshua Blystone, Superintendent
- c. **Person(s) responsible for overseeing pesticide applications**
Joshua Blystone, Superintendent
Norma Borgstrom, Field Supervisor
Maury Stewart, Field Supervisor
- d. **Person(s) responsible for managing pests**
Joshua Blystone, Superintendent
Norma Borgstrom, Field Supervisor
Maury Stewart, Field Supervisor
Licensed Sprayer/Operators
Unlicensed Sprayer/Operators operating under Manager's license

2. Pest Management Area Description and Habitats

The Cascade County Weed & Mosquito Division's district encompasses the entire county of Cascade. The county has a total area of 2,712 square miles. The Missouri River and the Sun River flow through the county and meet in Great Falls. Other rivers include the Smith River, Belt Creek, and several smaller drainages, all sources in the production of mosquito habitat. The majority of mosquito habitat resides along the waterways in small to very large sloughs that often flood during spring runoff. Flood irrigation along the Sun River is also a primary source for floodwater mosquitoes in the county. Many permanent water sites exist which contribute to the abundance of *Culex tarsalis* in mid to late summer. *Culex tarsalis* are the primary vector of West Nile Virus in Cascade County.

Man-made mosquito habitats include retention and detention ponds, sewage treatment facilities, tire piles, and open containers such as buckets, wheel barrows, abandoned swimming pools and hot tubs, and storm drains. These can cause small, localized increases in the numbers of adult mosquitoes.

The Weed Management side of the district was active for a number of years in locating, identifying, and spraying aquatic noxious weeds, primarily Purple Loosestrife. In recent years, with retirements and reduction in staff, much of this aquatic work ceased. It is the intention of the district to proceed with active inspection and identification of several aquatic weed species. Budgetary and seasonal employee constraints will determine the extent of aquatic weed control in Cascade County.

a. **Description of Target Mosquito Species**

Aedes vexans is a floodwater mosquito making up about 40% of trap collected adult mosquitoes (2007 to 2017 data) in Cascade County. Primary habitat for *Ae vexans* is found along the Missouri River in seasonal river sloughs, backwater channels, and areas influenced by the fluctuations in water table and flooding. Female mosquitoes from this species lay their eggs in the soil and on the edges of permanent water sloughs. As water levels rise, or as areas receive water due to snow melt, rain, or rising water table, and cover the eggs, larvae will begin to hatch. The continuing fluctuations of water levels can stagger hatches by days and even weeks. Research has shown that eggs can lay dormant for 5-7 years, but experience has shown this can be much higher. Larvae typically take about 10 to 14 days to emerge as adults but this is influenced by air and water temperature. *Ae vexans* is a very aggressive biter at all times. As is the same with other

mosquito species, biting and travel occur mostly in the evening. However, *Ae vexans* can be voracious biters during the day under a tree canopy or in the shade. Adults can be found from May through September.

Ochlerotatus dorsalis, melanimon, and nigromaculis are also floodwater mosquitoes and combined make up about 40% of trap collected adult mosquitoes. Larvae are found in pools produced by fluctuating water levels in marshy areas with irrigation waste water an important source. *Oc melanimon* larvae often prefer fresher water sources than *Oc dorsalis*. Larvae typically take about 10 to 14 days to emerge as adults but this is influenced by air and water temperature. Under ideal conditions, *Oc nigromaculis* can emerge in as little as 5 days. Adult female *Oc dorsalis* and *Oc melanimon* often migrate several miles from emergent sites. This has been seen as large numbers of these two species move from the Benton Lake Wildlife Refuge into the north end of Great Falls. Adults of these three species can be found from May through September.

Culex tarsalis is considered a permanent, semi-permanent water mosquito, meaning adult females lay eggs, in egg rafts, on the surface of the water. These egg rafts average about 200 individual eggs per raft. Shortly after the raft is laid on the water, larvae will begin to hatch from the eggs. It typically takes between 10 to 14 days for larvae to pass through 4 instars and the pupa stage before emerging as adults. Larvae can be collected in May but is more typical toward June. Adult numbers increase throughout June and usually peak mid to late July and begin to decrease until mid September. Female *Cx tarsalis* bite primarily at dusk and after dark and because of their vector capacity they are the most important mosquito species in Cascade County. *Cx tarsalis* is the known vector for West Nile Virus in Cascade County, in Montana, and in many western states. Data shows that median temperatures above 75°F for over one week increase dramatically the presence of West Nile Virus in adult mosquito pools. *Cx tarsalis* amount is about 14% of total collected mosquitoes.

- b. **Description of Target Aquatic Weed Species** (descriptions and pictures taken from www.mtweed.org/weed-identification/)

Purple loosestrife is a perennial that can grow up to ten feet in height and typically prefers moist or riparian habitat. Due to the numerous four-sided stems that are green to purple in appearance, this plant appears woody and bush-like in appearance. Clasping leaves have smooth margins, are lance shaped, and are heart-shaped or rounded at the base. *Purple loosestrife* leaves and stems are covered by downy fine hairs, and leaves are whorled or alternate on the stem. In autumn with dehydration, the leaves of *Purple loosestrife* turn red in color. The showy purple to magenta colored flowers is clustered on a long spike that can extend two inches to three feet down the stem called a raceme. Each flower has five to seven petals and blooms from June to September. Seeds burst at maturity around late July or early August, with each stem producing up to three million tiny seeds per year. *Purple loosestrife* has a dense, woody, and extensive root system. This root system and the prolific seed production results in rapid spread of loosestrife. In addition, stems of the plant that are broken off or disturbed often grow shoots. It is well suited to seasonal wetlands, and is capable of invading wet meadows, river and stream banks, pond edges, reservoirs, and ditches, irrigation canals, and marshes.



Curlyleaf pondweed is a hardy and incredibly invasive submerged aquatic. It has oblong 2 – 3 inch blue-green leaves that are wavy along the edges, like lasagna. Along the edges of the leaves you will find very small serrated edges. Like Eurasian Watermilfoil, the flower stalks stick above the water's surface and appear reddish-brown in color. This plant produces small greenish brown pine cone look-a-likes called turions. *Curlyleaf pondweed* forms dense mats in the water, which die off to create a great deal of waste in bodies of water. This plant has an extensive and dense root system and can tolerate extreme conditions. *Curlyleaf pondweed* can be distinguished from other pond weeds because its leaves attach to the stem in an alternating pattern and secondary veins branch from a mid-vein in perpendicular pattern. Native pondweeds have parallel leaf veins. Like many noxious invaders, *Curlyleaf pondweed* is an incredibly adaptive and hardy plant. It can grow in a variety of different locations and sediment types, and it can tolerate extreme conditions including low light and cold water temperatures and has even been found growing under inches of snow and ice. It can grow in deep or shallow waters and prefers soft soils and sediments. It will also grow well in waters that have strong waves or in streams with a moderate stream flow.

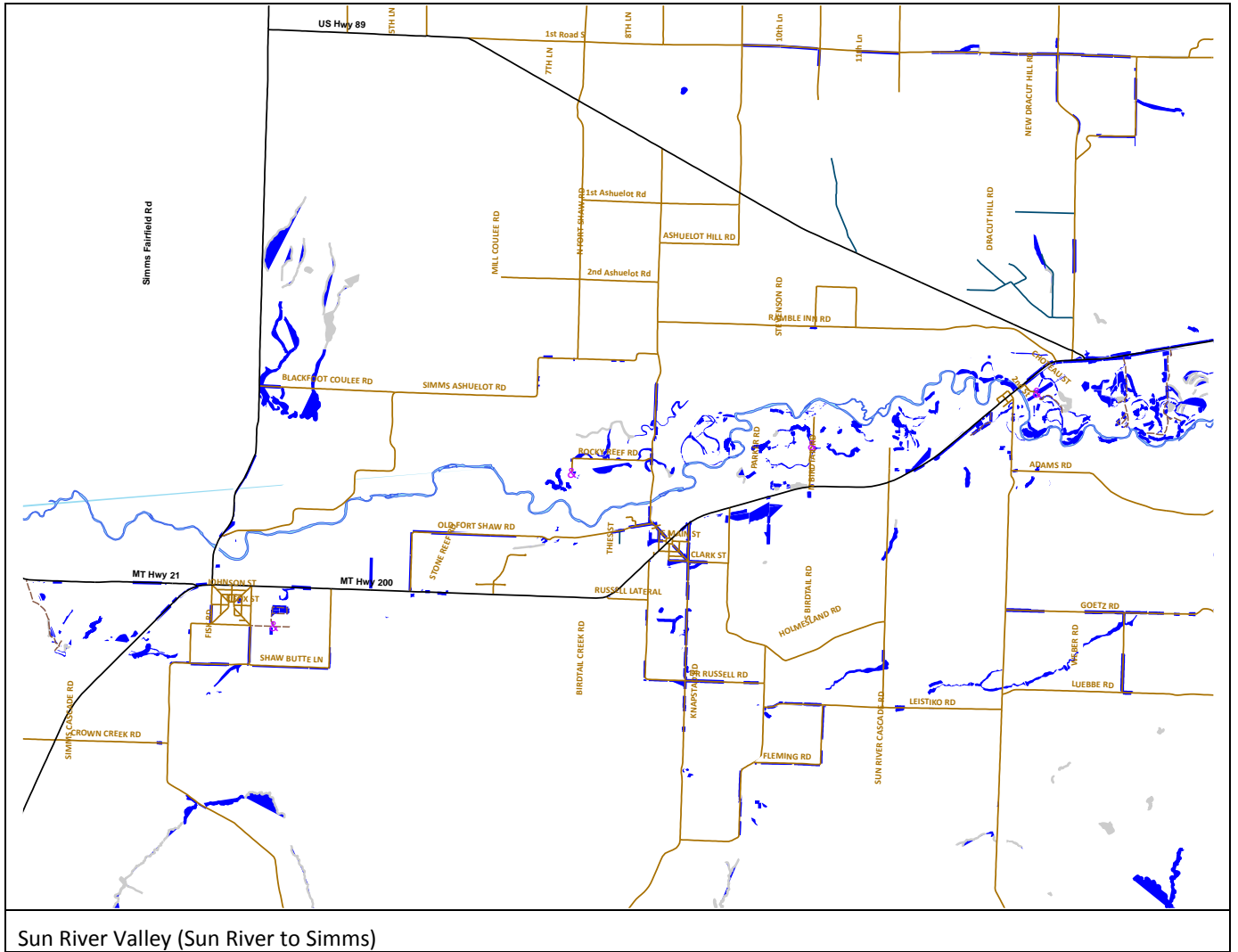


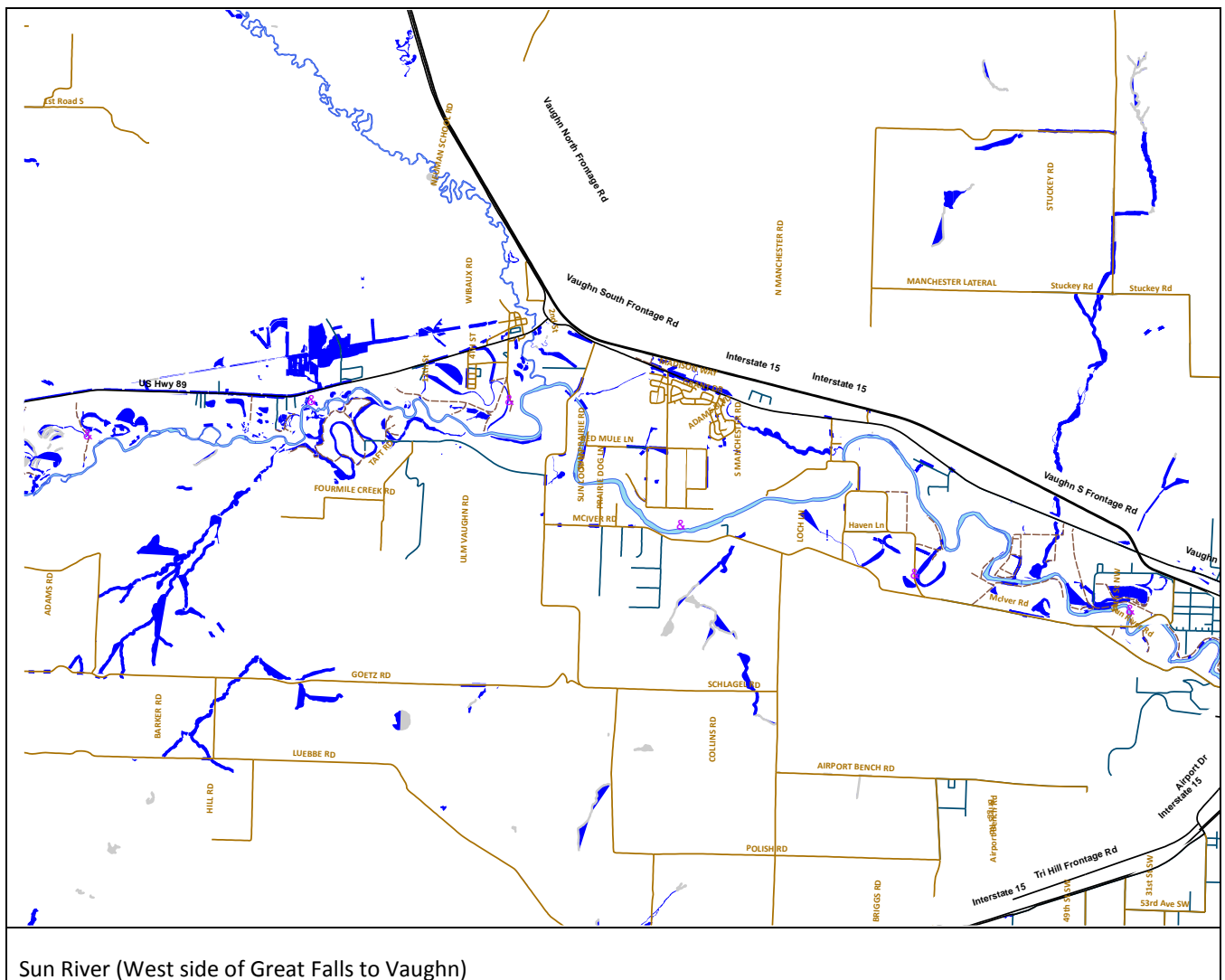
Eurasian watermilfoil or *EWM* is a new invader to Montana that continues to expand its territory. *EWM* is an incredibly invasive submersed aquatic plant. Like the native milfoils, the Eurasian variety has slender stems whorled by submersed feathery leaves and when the plant reaches the water's surface, it curls to lie parallel with the surface. Leaves are 2-4 cm long, feather-like, and arranged in whorls of 4 around the stem. The leaves are thread-like and uniform in diameter. They typically have greater than 14 leaflet pairs per leaf. This plant will only flower if it reaches the surface. Small red to pinkish four-petal flowers appear

on a flower spike that is 4-8 cm long held erect above the water surface. Without flowers, *EWM* is nearly impossible to distinguish from other milfoils and in order to correctly identify this plant, DNA testing must be done. *EWM* grows in a diverse range of aquatic habitats, including rivers, reservoirs, canals, lakes, slow-moving streams, and fish ponds.

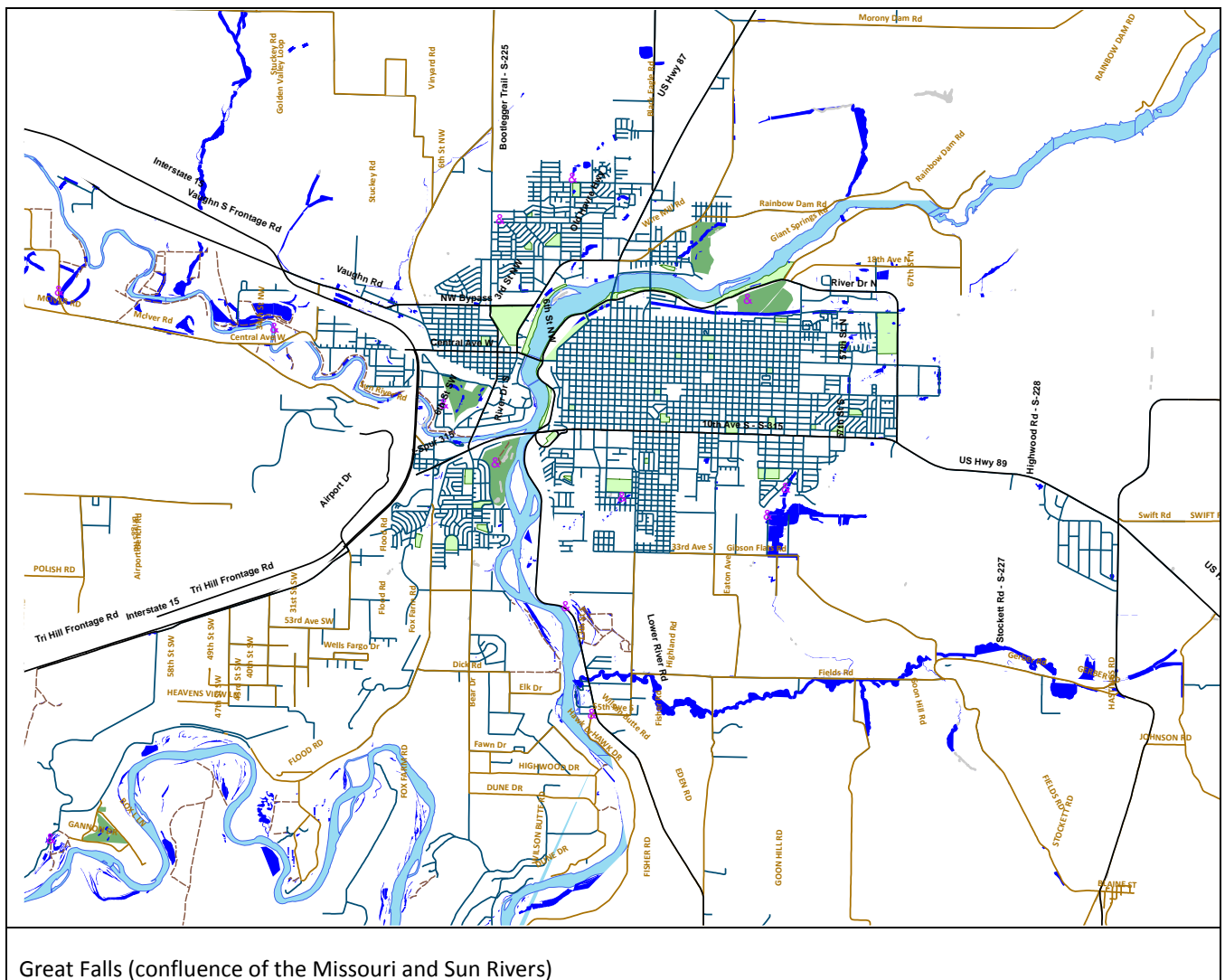


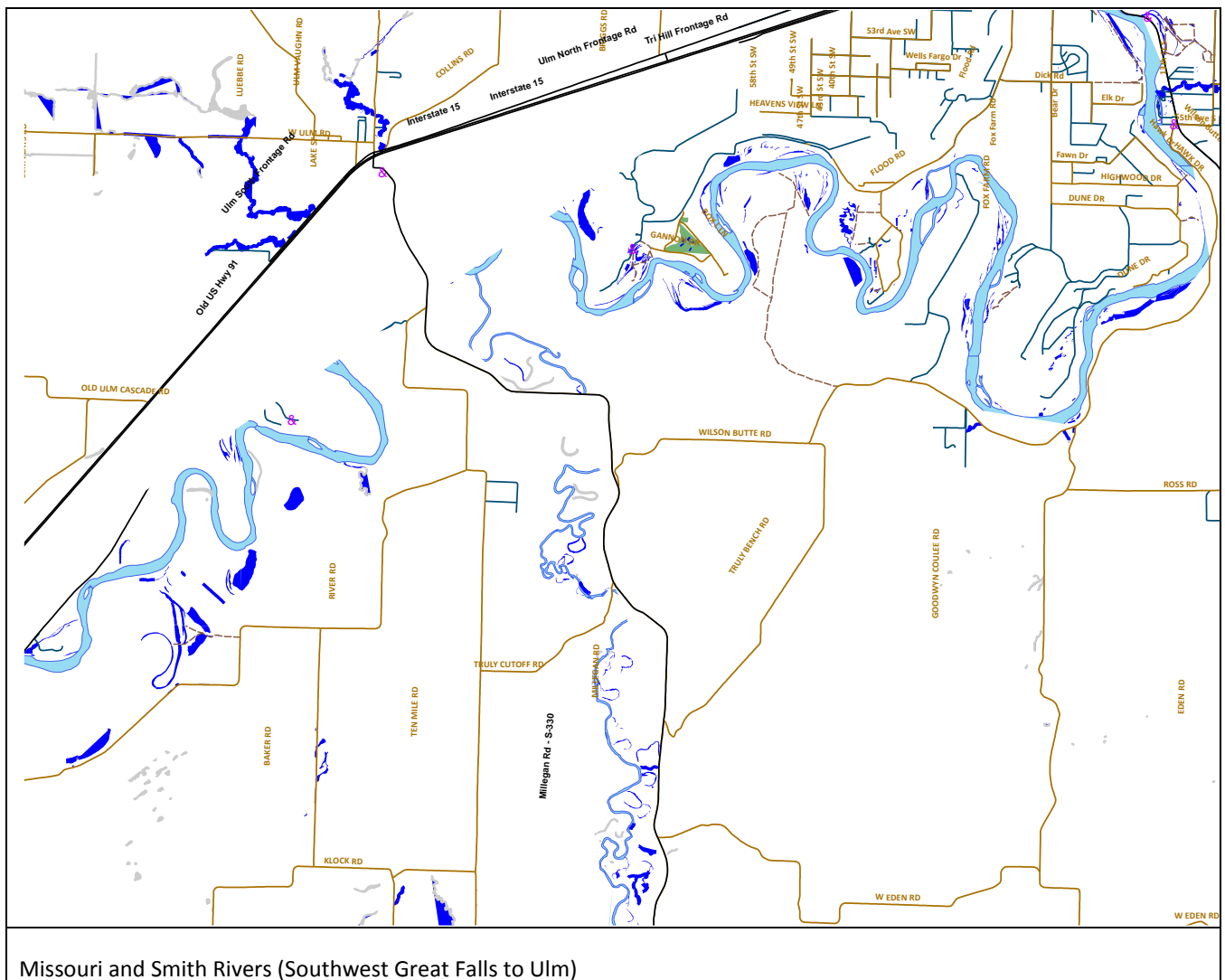
c. General Location Maps (blue lines and polygons indicate mosquito habitat)



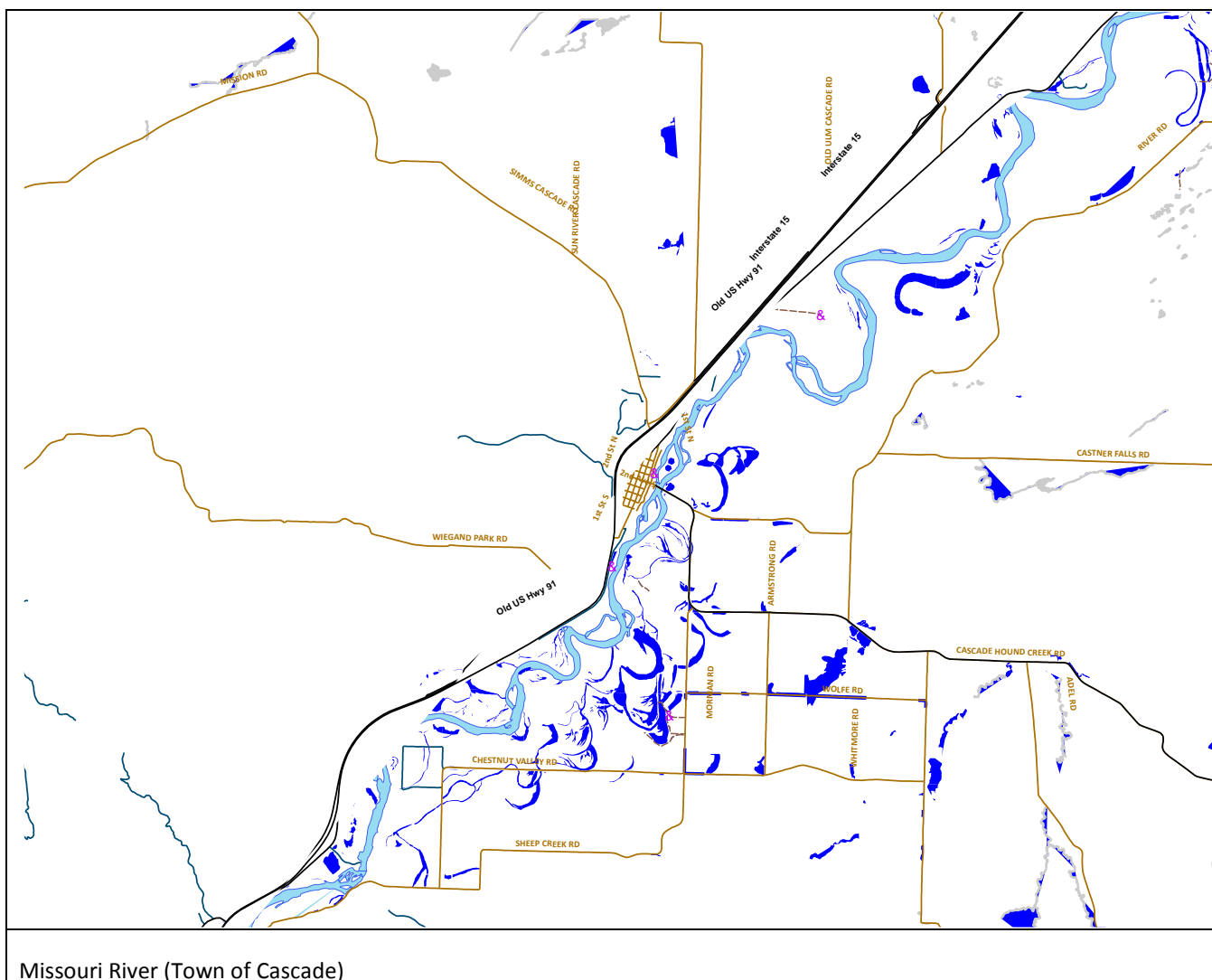


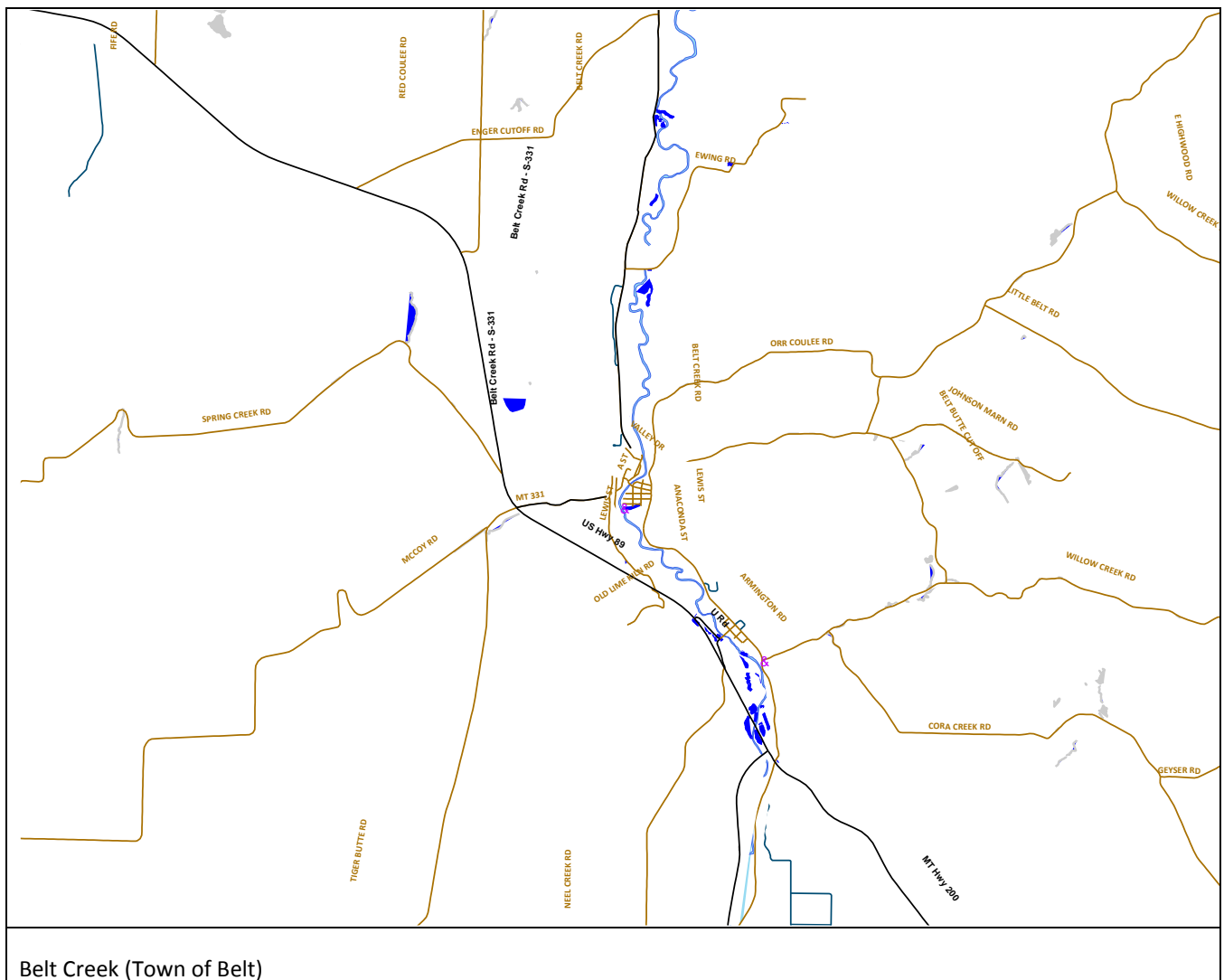
Sun River (West side of Great Falls to Vaughn)





Missouri and Smith Rivers (Southwest Great Falls to Ulm)





3. Control Measure Descriptions

a. Mosquito Control

The district follows the common mosquito control practices as described in **Best Management Practices for Integrated Mosquito Management** (American Mosquito Control Association, January 2017). All employees receive training in these practices, including how to conduct rapid field identifications to determine species of larvae and adult mosquitoes.

Cascade Weed & Mosquito Management uses the mosquito control measures listed in the table below:

Control Measure	Control Description	Habitat	Active Ingredient / Formulation	Surveillance Method	Threshold	Application Method	Pesticide Rate
Physical Control and Source Reduction	Empty or eliminate man-made mosquito habitats and containers. This includes cleaning and clearing ditches where water backs up due to heavy vegetation.	Typically found in residential areas. Tire piles, containers, abandoned swimming pools and hot tubs, and storm drains. May also include drainages or drainage ditches.	N/A	Property inspections, service requests and complaints, public education.	Any presence of containers holding water. Any ditch or drainage impeding the adequate flow of water, thus causing the creation of mosquito habitat.	No application of pesticide. Containers are emptied of water and disposed of if possible. Landowner cooperation to clean or dredge slow flowing ditches and drainages.	N/A
Larval Control	Larvacides	Flood irrigation, river flooding, emerging groundwater, marshes, swamps, pastures, sloughs, ditches, drainages, ponds, depression, retention and detention ponds, sewage lagoons, and catchbasins.	BTI (bacillus thuringiensis) granules by ground and aerial, liquid by ground, briquets by ground. BS (bacillus sphaericus) granules ground only. Methoprene liquid, pellets, briquets ground only.	Larval dipping	Presence of live larvae of target species. Floodwater mosquitoes >3 larvae / dip. Permanent / semi-permanent mosquitoes >.5 larvae / dip.	Ground application of granules, pellets, and briquets by hand, granule "shaker" bags, or Maruyama backpacks. Aerial application of granules by fixed wing aircraft. Liquid formulations by spray unit on truck, ATV, or pump up hand sprayer or backpack.	BTI granules (ground and aerially) 7-10 lbs/acre BTI briquets 1 / 100 sq ft BTI liquid 1-2 pts/acre. BS granules 7-20 lbs/acre. Combination BTI and BS 7-20 lbs / acre. Methoprene liquid 4 oz/acre Briquets 1 / 100 sq ft Pellets 3-5 lbs/acre.

Control Measure	Control Description	Habitat	Active Ingredient / Formulation	Surveillance Method	Threshold	Application Method	Pesticide Rate
Pupal Control	Pupacides	Same as Larval Control	Oil - highly refined petroleum distillate.	Larval dipping	>1 / dip (unable to properly identify in pupa stage)	Truck and ATV mounted sprayers, pump up backpack sprayers.	BVA2 larvicide oil 3-5 gallons / acre.
Adult Control (floodwater mosquitoes)	Ground and aerial applications.	Urban and rural areas	Permethrin, PBO as ULV Etofenprox as ULV	CDC CO2 baited surveillance traps, spray requests Landing/bite counts.	>50 floodwater mosquitoes / trap night. -or- >2 citizen spray requests w/in ¼ mile radius. -or- Employee inspection	Ground application using truck and/or ATV mounted ULV equipment. Aerial application using fixed wing aircraft. "No spray" areas will be respected.	Kontrol 4-4 8 oz/minute at 10 mph. Zenivex E20 3.6 oz /minute at 10 mph.
Adult Control (Cx tarsalis)	Ground and aerial applications.	Urban and rural areas	Permethrin, PBO as ULV Etofenprox as ULV	CDC CO2 baited surveillance traps, spray requests. Use of RAMP for detection of WNV. >50 RAMP units initiates immediate response. >100 RAMP units initiates verification by state health lab on mosquito pool(s). Joint press release w/ CCHD with verified mosquito pool(s).	>15 Cx tarsalis mosquitoes / trap night. -or- >50 RAMP units -or- Employee inspection	Ground application using truck and/or ATV mounted ULV equipment. Aerial application using fixed wing aircraft. "No spray" areas will be notified by phone of possible spray application.	Kontrol 4-4 8.1 oz/minute at 10 mph. Zenivex E4 8.1 oz / minute at 10 mph.

b. Aquatic Weed Control

The goals and objectives of the Cascade County Weed Management Plan, approved in April 2011, also include aquatic noxious weeds and their priority levels in regards to control. *Eurasian Watermilfoil* and *Curlyleaf Pondweed* are Category 1 weeds. *Purple Loosestrife* is a Category 2 weed. Category 1 is defined as a noxious weed not found in Cascade County, but which have the potential for imminent infestation. Early detection is critical. A Category 2 weed is defined as one whose distribution in Cascade County is limited to a small total area. Therefore small infestations can be treated effectively before infestations spread and become established.

Cascade Weed & Mosquito Management uses the aquatic weed control measures listed in the table below:

Control Measure	Control Description	Habitat	Active Ingredient / Formulation	Surveillance Method	Threshold	Application Method	Pesticide Rate
Physical Control	Hand pulling, use of water rake, or other type of physical removal and disposal.	Diverse range of aquatic habitats, including rivers, reservoirs, canals, lakes, slow-moving streams, and fish ponds.	N/A	Regular inspections of suspected areas. Public education.	Any presence of Category 1 or 2 weeds.	N/A	N/A
Category 1 Aquatic Weed Control <i>(Curlyleaf Pondweed and EWM)</i>	Herbicides labeled for use in water in consultation w/ Dept of Ag.	Diverse range of aquatic habitats, including rivers, reservoirs, canals, lakes, slow-moving streams, and fish ponds. Deep or shallow water w/ soft soils and sediments.	Glyphosate	Regular inspections of suspected areas, including irrigation canals. Regular floats on Missouri, Smith, and Sun Rivers. Public education.	Any presence of a Category 1 weed requires immediate action. Notify Dept of Ag as soon as possible.	Truck and ATV mounted sprayers. Backpack sprayers.	Aquatic Glyphosate from Montana State Herbicide bid. Rate determined by label.
Category 2 Aquatic Weed Control <i>(Purple Loosestrife)</i>	Herbicides labeled for use in water.	Seasonal wetlands, wet meadows, river and stream banks, pond edges, reservoirs, ditches, irrigation canals, and marshes	Glyphosate	Regular inspections of suspected areas, including irrigation canals. Regular floats on Missouri, Smith, and Sun Rivers. Public education.	Any presence of a Category 2 weed initiates targeted spraying during the growing season.	Truck and ATV mounted sprayers. Backpack sprayers.	Aquatic Glyphosate from Montana State Herbicide bid. Rate determined by label.

4. Control Schedules and Procedures

This section of the PDMP contains a list of the procedures used to implement the control measures described in Section 3 above and the schedules by which these procedures are performed.

Control Measure	Determination of Application Rate	Surveillance Method	Frequency of Application Rate	Spill Prevention Procedures and Schedules	Equipment Calibration Procedures	Equipment Maintenance Procedures	Environmental Condition Assessment
Physical Control and Source Reduction	N/A	Dipping/ larval counts	N/A	N/A	N/A	N/A	Property owner / manager / field supervisor consulted.
Larval Control	Use suggested application rate as determined by the label. The presence of heavy organic material or thick vegetation may make it necessary to use highest allowable rates.	Dipping / larval counts	Applications made when thresholds are exceeded and previous treatment is no longer effective.	Daily pre-trip inspections of equipment, spill kits on vehicles, mandatory chemical application training, including spill procedures.	Flow rates calibrated annually, at start of the season, and recorded on equipment for reference. Fixed wing calibration to be conducted and documented by contractor.	Daily pre-trip inspections of equipment for leaks, cracks, and proper operation. Repairs and maintenance completed during off season and as needed during season. Fixed wing maintenance to be conducted and documented by contractor.	Onsite weather evaluations by trained applicators. No applications made if wind is excessive.
Pupal Control	Use suggested application rate as determined by the label.	Same as larval control.	Same as larval control.	Same as larval control.	Same as larval control.	Same as larval control.	Onsite weather evaluations by trained applicators. No applications made if wind is excessive. No applications made if rain is likely within 6 hours.

Control Measure	Determination of Application Rate	Surveillance Method	Frequency of Application Rate	Spill Prevention Procedures and Schedules	Equipment Calibration Procedures	Equipment Maintenance Procedures	Environmental Condition Assessment
Adult Control (floodwater mosquitoes)	Using ULV machine set at mid label rate of fluid ounces per minute at 10 mph.	CDC CO2 baited surveillance traps, spray requests.	Applications made when thresholds are exceeded.	Daily pre-trip inspections of equipment, spill kits on vehicles, mandatory chemical application training, including spill procedures.	Flow rate / calibration set at beginning of season by manager or field supervisor. Checked periodically during spray season. Droplet testing completed and certified in May of each year.	Daily pre-trip inspections of equipment for leaks, cracks, and proper operation. Repairs and maintenance completed during off season and as needed during season. Problems reported immediately to manager.	Weather forecast monitored in advance. Onsite weather evaluations by trained applicators using wind and temperature gauges. No applications made when humans are present. No applications if wind exceeds 10 mph and/or temperature below 50°F.
Adult Control (Cx tarsalis)	Using ULV machine set at mid label rate of fluid ounces per minute at 10 mph.	<p>CDC CO2 baited surveillance traps, spray requests.</p> <p>Use of RAMP for detection of WNV.</p> <p>>50 RAMP units initiates immediate response.</p> <p>>100 RAMP units initiates verification by state health lab on mosquito pool(s).</p> <p>Joint press release w/ City-County Health Dept on verified mosquito pool(s).</p>	Applications made when thresholds are exceeded.	Daily pre-trip inspections of equipment, spill kits on vehicles, mandatory chemical application training, including spill procedures.	Flow rate / calibration set at beginning of season by manager or field supervisor. Checked periodically during spray season. Droplet testing completed and certified in May of each year.	Daily pre-trip inspections of equipment for leaks, cracks, and proper operation. Repairs and maintenance completed during off season and as needed during season. Problems reported immediately to manager.	Weather forecast monitored in advance. Onsite weather evaluations by trained applicators using wind and temperature gauges. No applications made when humans are present. No applications if wind exceeds 10 mph and/or temperature below 50°F.

Control Measure	Determination of Application Rate	Surveillance Method	Frequency of Application Rate	Spill Prevention Procedures and Schedules	Equipment Calibration Procedures	Equipment Maintenance Procedures	Environmental Condition Assessment
Physical Control	N/A	Regular inspections of suspected areas, including irrigation canals. Regular floats on Missouri, Smith, and Sun Rivers. Public education.	N/A	N/A	N/A	N/A	Property owner / manager / field supervisor consulted. Consultation w/ Dept of Ag may be necessary.
Category 1 Aquatic Weed Control (<i>Curlyleaf Pondweed</i> and <i>EWM</i>)	Herbicides labeled for use in water with suggested application rate as determined by the label. Consultation w/ Dept of Ag may be necessary.	Regular inspections of suspected areas, including irrigation canals. Regular floats on Missouri, Smith, and Sun Rivers. Public education.	Applications made when thresholds are exceeded.	Daily pre-trip inspections of equipment, spill kits on vehicles, mandatory chemical application training, including spill procedures.	Flow rate / calibration set at beginning of season by manager or field supervisor. Checked periodically during spray season.	Daily pre-trip inspections of equipment for leaks, cracks, and proper operation. Repairs and maintenance completed during off season and as needed during season. Problems reported immediately to manager.	Onsite weather evaluations by trained applicators. No applications made if wind is excessive. No applications made if rain is likely within 6 hours.
Category 2 Aquatic Weed Control (<i>Purple Loosestrife</i>)	Herbicides labeled for use in water with suggested application rate as determined by the label.	Regular inspections of suspected areas, including irrigation canals. Regular floats on Missouri, Smith, and Sun Rivers. Public education.	Applications made when thresholds are exceeded.	Daily pre-trip inspections of equipment, spill kits on vehicles, mandatory chemical application training, including spill procedures.	Flow rate / calibration set at beginning of season by manager or field supervisor. Checked periodically during spray season.	Daily pre-trip inspections of equipment for leaks, cracks, and proper operation. Repairs and maintenance completed during off season and as needed during season. Problems reported immediately to manager.	Onsite weather evaluations by trained applicators. No applications made if wind is excessive. No applications made if rain is likely within 6 hours.

5. Spill Response and Adverse Incident Response Procedures

The Cascade County Weed & Mosquito Division has in place a Pesticide Spill Response Plan (PSRP) which will be used with this PDMP. A copy of the PSRP, with standard operating procedures in the event of a spill, is included.

6. Plan Updates

The Cascade County Weed & Mosquito Division Pesticide Discharge Management Plan will be reviewed and updated by the Pesticide Discharge Management Team whenever necessary to update the pest problem identified and to evaluate pest management strategies.